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Information

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Check out the Pesticide Education and Assessment Program web site at ***http://pesticide.umd.edu***

Cholinesterase Testing

Pesticide Information Leaflet No. 7

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Revised May 2006

Cholinesterase is an enzyme necessary for proper nerve impulse transmission. If the amount of this enzyme is reduced below a critical level, nerve impulses to the muscles can no longer be controlled, resulting in serious consequences and even death. Two classes of insecticides, the organophosphates and the carbamates, act as cholinesterase inhibitors; that is, they reduce the amount of cholinesterase available for the body's use. One OP herbicide (Betasan) and the desiccant DEF, or Folex, can also have this effect.

Depression of cholinesterase below the critical level may occur from a single large exposure, such as spilling the concentrate insecticide on yourself, or from a series of small exposures over a long period of time, such as applying these materials throughout an entire growing season. An applicator may exhibit symptoms within 48 hours after an application, after which the symptoms may disappear until the next exposure. Symptoms of overexposure to cholinesterase inhibitors include headaches, dizziness, blurred vision, nausea and vomiting, stomach cramps, diarrhea, excessive salivation and sweating, tightness of the chest, muscle twitching, and pinpoint pupils.

Persons only occasionally exposed to cholinesterase-inhibiting insecticides through residues in and around structures or landscapes, or through residues on foods are not considered to be at risk for significant cholinesterase inhibition. However, if you are an applicator working with organophosphates and carbamates, you should ask your physician about having regular cholinesterase testing done. This consists of monitoring the level of cholinesterase available in the blood throughout the application season. Since the amount that is normal varies from person to person and fluctuates over time, it is essential to have your own baseline cholinesterase level established. Therefore, you must have a blood test taken at the beginning of the season, *before* you begin working with these pesticides. Your physician can then compare the results of subsequent cholinesterase tests to your own baseline value to determine whether the

level of cholinesterase available has dropped significantly. If it drops as much as 25% to 30%, *you must not use any organophosphate or carbamate insecticides until your cholinesterase level has returned to normal*.

Following label directions, using caution during mixing and application, wearing clean protective clothing, and showering after each day of application will keep your exposure to pesticides at a minimum. If you are informed that your cholinesterase level has dropped, you should analyze your pesticide handling practices to determine how you could reduce your exposure in the future.

Some cholinesterase inhibitors cause only minor inhibition, while others are very potent. The inhibitory effect of carbamate insecticides is reversible, and cholinesterase levels will return to normal within a relatively short time. Inhibition by organophosphates, however, is not reversible, and levels will only return to normal after the body has had enough time to manufacture new cholinesterase. Depending on the level of cholinesterase inhibition, this process may take up to three months.

Cholinesterase-inhibiting pesticides are identified on the following page, listed by common name, with trade names in parentheses. However, you should check the active ingredient list on the label of the pesticide to see if it contains one of the common names listed since not all trade names can be included here. Newly registered active ingredients or those not commonly used may not be listed here. New product labels are required to identify cholinesterase inhibitors, but the labels of older products may not have been revised to include this information.

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Organophosphates

acephate (Orthene, Payload)
azinphos-methyl (Guthion, Sniper)
bensulide (Betasan, Prefar)
carbophenothion (Trithion)
chlorethoxyfos (Fortress)
chlorfenvinphos (Birlane, Supona)
chlorpyrifos (Dursban, Lorsban)
chlorpyrifos-methyl (Reldan)
coumaphos (Co-Ral)
demeton (Systox)
diazinon (DZN)
dichlorvos (DDVP, Vapona)
dicrotophos (Bidrin)
dimethoate (Cygon, Rebelate)
dioxathion (Delnav)
disulfoton (Di-Syston)
EPN
ethion (Tomahawk)
ethoprop (Mocap)
ethyl parathion (Orthophos, Parathion, PhosKil)
famphur (Warbex)
fenamiphos (Nemacur)
fenitrothion (Sumithion, Rothion)
fensulfothion (Dasanit)
fenthion (Baycid, Baytex, Tiguvon)
fonofos (Dyfonate)
isazophos (Miral, Triumph)
isofenphos (Amaze, Lighter, Oftanol, Pryfon)
malathion (Cythion)
methamidophos (Monitor)
methidathion (Supracide)
methyl parathion (Penncap-M)
mevinphos (Phosdrin)
monocrotophos (Azodrin)
naled (Dibrom)
omethoate (Folimat)
oxydemeton-methyl (MetaSystox-R)
parathion (see ethyl parathion)
phorate (Thimet)
phosmet (Imidan)
phosphamidon (Dimecron)
phostebupirim (see tebupirimiphos)
pirimiphos-ethyl (Primicid)
pirimiphos-methyl (Actellic, Silosan)
profenofos (Curacron)
propetamphos (Safrotin)
sulfotepp (Bladafum)
sulprofos (Bolstar)
tebupirimiphos (Aztec)
temephos (Abate)
terbufos (Counter)
tetrachlorvinphos (Rabon, Gardona)
tribufos (DEF 6, Folex)
trichlorfon (Dipterex, Dylox, Proxol)

Carbamates

aldicarb (Temik)
aldoxycarb (Standaz)
bendiocarb (Ficam, Garvox, Turcam)
carbaryl (Sevin)
carbofuran (Furadan)
carbosulfan (Advantage)
fenoxycarb (Logic)
formetanate (Carzol)
methiocarb (Mesurol)
methomyl (Lannate, Nudrin)
mexacarbate (Zectran)
oxamyl (Vydate)
pirimicarb (Pirimor)
promecarb (Carbamult)
propathrin (Danitol)
propoxur (Baygon)
thiodicarb (Larvin)
trimethacarb (Broot, Landrin)